

Research Notes

Enhancements to the FHWA-FST2DH Model for Simulating Two-Dimensional Depth-averaged Flow and Sediment

Program Steering Committee (PSC): Design and Construction

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Title: Enhancements to the FHWA-FST2DH Model for Simulating Two-dimensional Depth-averaged Flow and Sediment Transport TPF-5(248)

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TITLE: Enhancements to the FHWA-FST2DH Model for Simulating Two-dimensional Depth-averaged Flow and Sediment

Enhance a computer program "FHWA-FST2DH Model" that shows the length and height direction of debris and sediment flow in water at either river bends or under the bridges.

WHAT IS THE NEED

Scour, the most common cause of bridge damage needs to be assessed and measured in order to minimize the damage. FST2DH is FHWA's Two -Dimensional Hydraulic Model for modeling flows in floodplains and through complex bridge openings. However, the model was developed more than ten years ago, and since that time many improvements have been made to computational procedures employed by the program. Because of the increasingly more difficult types of problems that are routinely being encountered, the state-of-the-art practice needs to continue to keep pace.

Currently two associated tasks for licensing renewal agreements “Surface-water Model System (SMS)” and the “Watershed Modeling System (WMS)” both contain graphical user interface (GUI) that support the FST2DH Model.

WHAT ARE WE DOING

State DOT's and practitioners noticed that the FHWA-FST2DH Model for Simulating Two-dimensional Depth-averaged Flow and Sediment Transport showed instabilities for some cases and therefore an improvement of the model was needed. FHWA decided to transition from the FHWA-FST2DH Model to a new two-dimensional hydraulic river modeling program, SRH-2D developed by the U.S. Bureau of Reclamation (Reclamation).

The SRH-2D hydraulic modeling program has been used by Reclamation and other agencies for many years. It is recognized for its ability to achieve stable solutions to complex hydraulic problems quickly and effectively.

WHAT IS OUR GOAL

The goal is to produce an improved modeling tool that will achieve a more reliable sediment transport analysis capability. An updated User's Manual will also be provided that will document the capability and any new features of the modeling tool.

WHAT IS THE BENEFIT

The faster computation and update of the algorithm will save time, increase productivity and provide better solutions to complex water flow, design of hydraulic structures such as bridges, and river training works that can provide erosion control, better water quality and flood mitigation.

WHAT IS THE PROGRESS TO DATE

FHWA hydraulic engineers have evaluated the current program's capabilities and see a significant potential benefit of the USBR SRH-2D model for future Department of Transportation (DOT) hydraulic related projects.

They discovered the current version of the SRH-2D program does not include the analysis of key Structural features that are often required for transportation related hydraulics projects. The FHWA is broadening the use of the model by making it more applicable to a wider range of projects. FHWA established an Interagency Agreement with the Reclamation using TPF-5(248) funds to incorporate modeling tools into SRH-2D needed for transportation related hydraulics projects. New features and testing of the model will be done next. We expect to have the project completed in fall 2014.

IMAGES

